ENERGY CONSERVATION MATERIALS PACKAGE

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Energy Conservation in the School Curriculum

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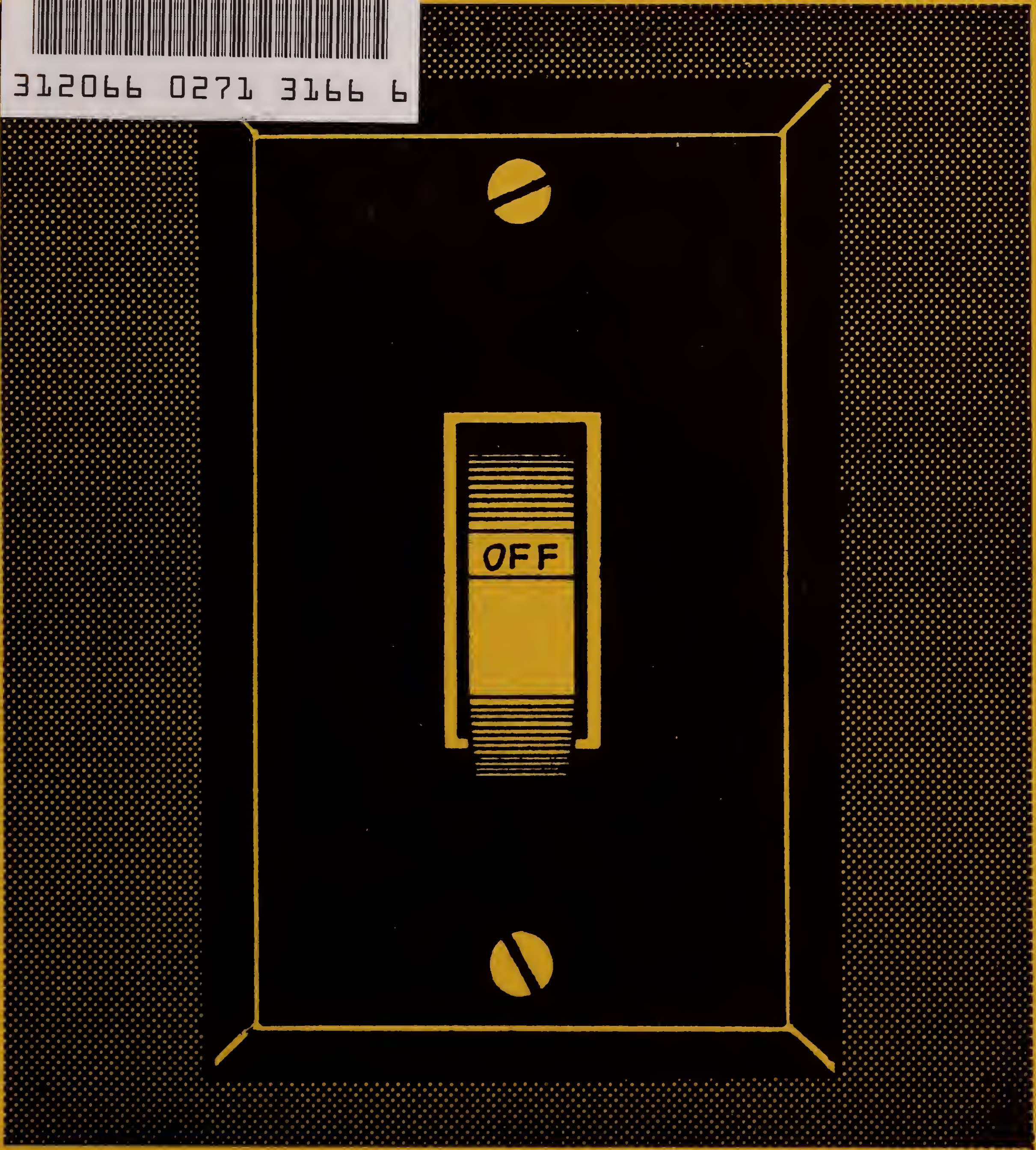

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ENERGY CONSERVATION IN THE
SCHOOL CURRICULUM

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THE THREE "E's" IN THE CURRICULUM: STYLES AND PRIORITIES

There seem to be three main methods of introducing the three "E's" into the curriculum. These will be discussed under the headings of Awareness, Missions, and Integration.

Awareness

It is natural that the first impact of energy or any other new theme is on citizen awareness. Drugs, or racial tensions, hit the front pages and students want to talk about them. The long lines of irritated motorists waiting for gas brought the energy crisis into the classroom. Students wanted to know what was happening and teachers wanted to tell them and to vent their own frustrations or air their own solutions.

Awareness is a proper educational goal. Students should know what is happening in their world and education should select and illuminate current problems. But awareness is related to media attention. When the gas lines disappear, when the newspapers and television look away, so do students and teachers. Once the alarm has been rung, the dire warnings given and the disasters predicted, it is hard to gain attention in the same way again. The deeper problems may remain, but students demand more than simply to be told about these problems; they want to find out how to do something about them.

Mission

With awareness often comes mission orientation. Drug education for instance is mission-oriented toward reducing or eliminating drug usage. The obvious mission in the energy area is the one we are now involved in: energy conservation.

It is obvious that a necessary component of almost any overall strategy aimed at reducing the tension among the three "E's" is the reduction in consumption. It is also obvious and natural for those who pilot these strategies to want to get their message loudly and clearly into the classroom. Students are valuable allies. Not only are their own life styles and habits of consumption open to influence but their parents and others in the adult population can often be reached through them.

It is exactly because of this that mission-oriented education is potentially dangerous and should be entered upon only with great caution and under careful surveillance. The schools are so potentially effective as a propaganda arm that they must be protected. Our system is deliberately designed to provide that protection.

Energy conservation is so obviously beneficial that it appears safe to relax our vigilance against propaganda and allow the various messages to come through. "Turn down the thermostats; turn off the lights; bus more and drive less." No harm can come from these prescriptions. But mission-oriented education, however worthy its goals, remains alien to the most important purposes of American education. Educators do not want to teach the students what to do in the situations which do and will confront them. Rather they want to teach them sound strategies of analysis and decision-making so that they can, themselves, decide what to do.

The spectrum of issues to be faced in the next two or three decades is too broad for anyone to anticipate the proper targets. It is only by becoming components of the basic thrust of all teaching that energy economics and environment will make their strongest and most lasting contribution to curricula.

Integration

There are two different ways in which a group of ideas, facts, and concepts, such as those included in the three "E's," can impact the curriculum. They can appear as new courses or curricula following the examples from the 1960's when PSSC, BSCS, Them Studies, the High School Geography Project, etc. were designed and implemented. There is a place for a course on the three "E's" in many schools and the design of three such courses would provide worthy funding projects and exciting challenges.

The curriculum is too crowded, however, and there are too many other worthy subject areas (career education, black studies, drug education, sex education, etc.) for a new course to make much impact. There will be schools which can afford a variety of courses and students with enough time, talent, and interest for a course on Energy, Economics, and the Environment (or some such title) but the bulk of the student body will not be reached in this way.

To achieve maximum impact, the themes embodied in the three "E's" must pervade the existing system. These themes must find natural employment in the satisfaction of basic learning goals. In achieving this integration into the existing curricula, they will be greatly assisted by the fact that the themes themselves are basic.

THE THREE "E's" AS INTEGRATED CURRICULAR COMPONENTS

The long-term urgency associated with the interconnected problems of the three "E's" along with the basic nature of the concepts involved, make it essential and efficient that these concepts, ideas, and facts be integrated into the K-12 Curriculum. Integration is the operative word because for the most part, the ideas must become vehicles for existing learning goals rather than separate goals in themselves. This prescription can be illustrated with the following examples:

> There is a period in most 2nd or 3rd grade classes when the focus is on the structure of the local community. This activity provides an excellent opportunity for children to examine the community's transportation system. Students cannot only describe where people go and how they get there; they can also estimate the energy cost of existing and alternative methods of getting people to their destination.
>
> The three "E's" can also be integrated into teaching units designed to explore the structure of their community and its relationship with the world outside. Students can investigate the forms and local sources of energy in their local areas and then go beyond the local community to consider ultimate sources of energy; the methods and effects of its production, extraction, and transportation. A further understanding of the three "E's" can be developed by looking at jobs that are directly or indirectly related to energy.
>
> Further along in the K-12 sequence, one may take advantage of geography lessons. If the world as a whole is the target, then, as they contrast regions and cultures they should also contrast energy resources and energy consumption. Energy trade becomes yet another of the global linkages which deserve emphasis.
>
> In another class there will be a unit on the Middle East. Here a teacher should consider the treatment of the subject incomplete if it does not involve discussion of energy resources, energy dependency, etc. How much oil is there, where is it sold, what effect is it having on the local population, how does it influence their national and international politics, etc.?
>
> This focus on the Middle Eastern oil picture in a geography class could be paralleled with complimentary themes in other classes for those same students. In a physical science class they could study the molecules of oil and natural gas as well as the chemistry involved in cracking and refining crude oil to gasoline or in using petrochemicals to make plastics. In an earth science class, a unit on oil exploration would allow much learning to take place and there, or in a biology class, the formation of oil from once-living material would be worthy of study. In a social studies class the international politics of oil, in particular the Arab-

Israeli impasse, would grow from the same theme. In an English class a group of ads from oil companies and conservation groups could be used for practical work in critical thinking. Finally, one could focus all of the students' attention, for a week or so, on related issues from some part of the three "E's" picture and by doing so make those important points, not only about the complex nature of real problems, but also about the utility of the separate academic disciplines in dealing with such problems Admittedly this kind of educational experience is rare.

There are, of course, a host of similar examples that could be given in support of the integration of the three "E's" but these two or three, at least, make the point that it could happen.

PROBLEMS IN ENERGY CURRICULUM DEVELOPMENT: THE CONTRIBUTION OF IECL WORKSHOPS

Lessons for Future Developers

From workshop discussions, source guidelines and suggestions of future needs were gathered. The obvious desirability of the involvement of teachers and students at all stages of development was underscored.

Also stressed was the importance of a technical review for produced materials. Obtaining such a review is no easy matter. Both the breadth of the subject matter including physics, chemistry, biology, geology, engineering, economics, political science, ethics and philosophy, and the existence of different points of view (on nuclear power, for instance) make it imperative that a diverse technical review be provided. The existence of different viewpoints is one of the educationally important features and it is important, therefore, to present controversy fully rather than to hide it in blandness and brevity.

It is a further strength of energy education, and indeed of environmental education, that it is inescapably multidisciplinary and problem-oriented. For this reason it should be taught through styles and strategies which are not wholly presentational. Team teaching, role playing, student and class projects are particulary appropriate pedagogical techniques.

The Problem of Curricular Variety

A weakness of present energy education is that it has most often been directed at a small elite group of students, largely those in the sciences. In the IECL workshops it was suggested that further variety would be desirable in the high schools. Integration of energy themes, in particular, themes which provide stimulus and suggestions for energy conservation, should be accomplished in all curricula. This integration would be equally appropriate in vocational curricula, driver education, home economics, career education, etc.

Several workshops also reminded us that adult education is an important function of state school systems and recommended that special courses featuring both reasons and strategies for energy conservation be developed for adult consumption.

Other Avenues of Change

Several other important methods of bringing the three "E's" usefully into the school curriculum were given attention in the workshops. It was pointed out by several participants that the teacher-training institutions are important in any strategy to accomplish integration of energy themes into the curriculum. There was considerable discussion of possible ways to influence the development of "methods courses" in the sciences and social studies areas which would deal with energy-related topics and examples. It was generally agreed that although one could expect some leadership from education facilities and text book authors, the major movement would probably be from the bottom up, and that the teachers themselves should remain the primary target of any energy education campaign.

Another route for energy ideas is provided by television. This medium is, of course, the most effective as far as exposure is concerned and therefore is already playing some role in general energy conservation education. Two other uses of educational TV were also put forward. As teacher interest in energy topics develops there will be concepts--some of those from nuclear energy, for instance--which will be (chiefly for technical reasons) difficult for teachers to handle. Some of these could be presented via TV. TV can also be important in the training workshops which will be needed if energy/environment ideas and teaching techniques are to become a part of the general teacher repertoire.

SUMMARY

Workshop participants at all four IECL conferences were united in their belief that energy-related themes were both appropriate for and urgently needed in the educational curriculum. While these related ideas could properly, at the high school level, form the basis for a full course, it was generally agreed that more students would be reached most effectively if the themes were integrated into present curricula.

In order for this to happen a variety of conditions must be met: Educational Administrators from the Chief State School Officer to the local principal must be convinced of the importance and appropriateness of the subject. Useful material which is technically correct, unbiased, and student-oriented must exist. Teachers must not only be made aware of the materials but motivated and prepared through local workshops for their use.

THE PUBLIC SCHOOLS AND THE ENERGY CRISIS

by

S. DAVID FREEMAN

An address delivered to the Boston Conference of the
INTERSTATE ENERGY CONSERVATION LEADERSHIP PROJECT
January 7, 1975

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THE PUBLIC SCHOOLS AND THE ENERGY CRISIS

The Arab nations did us no favor when they ended the oil embargo last spring. If the embargo against the United States had continued over the past year, I have little doubt that by now the first process of painful readjustment would be largely behind us. Americans, as a matter of necessity, would have cut back on their lavish, wasteful use of gasoline, and other forms of energy. The air in our cities would be cleaner. Our balance of trade would be in the black rather than the red. Our foreign policy in the Middle East would not be distorted by worry over another embargo. And other consuming nations might be following our lead to stop the drain of petro-dollars that threatens to plunge the world into a prolonged recession or even depression.

But the oil embargo didn't last long enough for America to withdraw from its addiction to energy. The crisis was pronounced over by President Nixon just about the time the people and the government were beginning to face up to the consequences of a lifestyle utterly dependent on an energy lifeline that can be cut off at a moment's notice. The embargo only gave us a sneak preview of the future. But it was quite a jolt, one that touched the lives of every American. And despite the tendency of most people to go back to sleep on the issue, the energy crisis is not fading away. In fact, it is closing in on us.

The package of problems that we call the energy crisis is ushering in a new era for America and the other industrialized nations of the world. It is an era of scarcity in energy resources and materials. Hopefully, it will be accompanied by a greater abundance in moral values, love and enjoyment of our fellow human beings and the beauty of nature, as well as growth in a variety of knowledge-intensive, socially useful economic activities. But the new patterns of growth are only dimly perceived at the moment while the scarcity of energy and the continued pollution of the planet are harsh realities.

The old patterns of economic growth devoured hugh quantities of energy and materials. Such growth is now sputtering to a halt. The recession we are experiencing has a direct connection to the energy crisis because its origins are similar. The Disposable Society is in serious trouble because it is running short of cheap feedstock. And the Durable Society that must take its place isn't even part of the school curricula yet.

It is not often that public policy questions of such profound importance to the welfare of mankind can be connected so directly to the way people live and the values they hold dear. But the energy crisis is such an issue, especially if it is perceived in its full dimensions. It is also not often that the public is given a sneak preview of how vulnerable they are before real disaster hits. The painful memories of waiting in line for gasoline, and perhaps more important, the utter helplessness and fear of not knowing how bad it might get is perhaps the best thing going for policy makers and teachers alike. These memories combined with the harsh facts of today are quite useful in making mental contact as we try to reshape our public policies and to some extent our way of living in order to avoid a breakdown in our high-energy civilization.

The energy crisis can be the most effective teaching aid of the decade. It provides a handle for teaching students some of the most important lessons they need to learn by relating the issues to fundamental experiences in the students' lives such as where they live, how they get to school, where they go on vacation, what quality air they breathe, and where they will work when they graduate.

Educators of course have a dual interest in the energy crisis. The first is how it will affect the school lifestyle. What temperature should the classroom be? Will there be enough gas for the school buses, for the teacher's car? Will the high cost of fuel be paid at the expense of teachers' salaries? These kind of questions are very real and very important. But they merely illustrate how vitally the energy issue affects every element of society.

The direct impact of the energy crisis on the schools is but the tip of the energy crisis iceberg, the part that is plainly visible. The real challenge and responsibility of public education is to go "below water" so to speak and expose the entire problem with all of its ramifications. But exposing the problem is not enough. We must begin to hammer out a solution.

What is taught about the energy crisis in the classroom is much more important than the room temperature or even the priority a school gets in oil allocations. The energy crisis reflects a set of problems that require changes in attitudes, values, lifestyles, and methods of construction that will require many years to achieve. Unless the next generation of adults learns about the problems and the solutions in their formative years, the future is without hope. We are all going to endure some discomforts as we make the transition. And I don't ask educators or students to ignore their rights or obligations as consumers of energy. I only ask that educators give the highest priority to their role as teachers. And teachers must be extra sensitive to avoid the temptation of always concluding that what's good for the school house must be good for the country.

Teaching about the energy crisis must begin with a statement of the fundamental problems that are involved. They can be summarized as follows:

1) Runaway prices of fuels and electricity that are at the heart of the world's enconomic woes,

2) Environmental pollution from the exploitation and use of existing sources of energy that poses a clear and present danger to the health of mankind and the beauty of nature,

3) Steadily growing shortages of energy that cast a dark shadow over the prospects for economic growth as it has occurred in the past,

4) The gigantic flow of petrodollars from consuming nations to the oil producers poses a real danger of economic collapse to some European nations and could undermine democratic government or trigger a worldwide depression.

5) Continued dependence by the United States on oil from Arab nations that inhibits our ability to negotiate peace in the Middle East.

6) Problems of social equity between poor and rich Americans and among poor and rich nations that are caught up in the question of the price and availability of energy-issues that test our lip service for an equitable distribution of affluence on this planet.

The energy crisis is thus wrapped up in mind-boggling issues that are cosmic in nature. But we dare not be overwhelmed by the life or death nature of what is at stake. The implications are certainly complex and crucial but the fundamental pathways for solution are beyond dispute and easy to teach.

A worldwide commitment to energy conservation combined with research and development of cleaner sources of energy is the fundamental solution to the energy crisis. Conservation of energy must be the backbone of our policy. Cutting out the waste and extravagance in our use of energy can help solve all of the problems that make up the energy crisis. And without a sharp departure from the promotional policies of the past and the present we will continue chasing our tail and never really catch up. The necessary efforts to clean up and enlarge the world's supply of energy cannot possibly succeed in balancing the planet's energy budget unless we begin to practice conservation.

Conservation must come in three stages:

1) Cutting back on some of the wasteful uses of the cars, homes, and factories that are already built. This phase is limited because there is only so much that can be done with glass houses, gas-guzzling cars and energy intensive industries that were constructed in years past. But savings must be achieved even if it means some discomfort. Rationing is most likely necessary, if substantial savings are to be achieved with fairness to all income groups.

2) For the years immediately ahead incentives and performance standards must be enacted so that new homes, cars, factories take advantage of technology that uses less energy.

3) And for the future, new patterns of economic growth and research and development of new technology must be pursued, so that the energy requirements to sustain a high quality life can be reduced even further.

Conservation must become a new ethic in American life. Saving energy and materials in general must become as much an ingrained habit in what we do and what we build as growth and lavish consumption have been in the past. It's not just a matter of driving more slowly and heating and cooling buildings more moderately. Energy-saving means recycling metals, new designs for buildings, living closer to where you work, and for those who already have "one of each" developing goals and values for life that are less materialistic.

The reasons for teaching and adopting the conservation ethic are basic. If we are to preserve the environment and our freedom of action in foreign policy, and improve the economic health of the nation; if we are to sustain a civilization that is now dependent on energy sources that will peak out in a few short decades; if we are to buy the time to harness the sun and develop other cleaner, long-lasting sources of energy--then we have no other choice. Conservation is essential to the survival of civilization as we know it and wish it to continue.

The final report of the Ford Foundation's Energy Policy Project lays out a program for achieving a cut in the nation's energy growth from the 4.5 per cent of the last eight years to about 2% a year. Congress, and where appropriate state governments, should:

Adopt minimum fuel economy performance standards for new cars, so as to achieve an average fuel economy of at least 20 miles per gallon by 1985.

Enlarge the funding for public transportation, especially buses which can be built quickly.

Encourage more efficient space heating and cooling by making credit easily available for energy-saving investments in existing buildings, by setting higher standards for insulation and heating and cooling systems, by helping to upgrade building codes and providing technical assistance to builders.

Shift federal research and development money toward energy-conservation technology, and stress government purchases of energy conserving equipment--thriftier cars, tighter buildings, recycled materials and the like.

Encourage industry to conserve energy through prices that reflect the full costs of producing energy and other appropriate measures. This means Congress should eliminate the special tax privileges of the energy industry--oil depletion allowance, expensing of intangibles and special foreign tax credits--all of which constitute subsidies to an already rich industry. It also means abolishing promotional discounts for big electricity users and facilitating on-site generation of power to make beneficial use of waste heat.

Through these and other measures, the nation could bring its energy growth rate down to a more menageable 2% without in any way limiting economic growth, employment or household comforts. This kind of energy conservation program would pay some very handsome dividends for the nation. There would be less investment in new coal mines and oil refineries and drilling rigs and power plants and more investment in energy-saving technologies. The result would be less inflation since investments to save energy are cheaper than investments in getting more. Slower energy growth means that net savings in capital investments over the next 25 years would amount to some $300 billion.

It would also mean that from the present to 1985 the nation could meet energy demand without resorting to developments that threaten grave environmental damage and that threaten the independence of our foreign policy. It would be possible to keep oil imports below today's level and still stop strip mining for coal in the arid West or on steep slopes in Appalachia. Alternatively, the nation could halt new construction of nuclear plants and also preserve the Atlantic and Pacific Coasts from offshore development. In any event we would buy the time to permit all of these energy sources to be developed at a more cautious rate.

These conservation measures are only the more obvious features of a broader restructuring of our economy and changing of values, especially as they relate to material goods. School officials have an important role to play in instilling in young minds that the joy of making something last can be as great as buying something new. It won't be easy. It cuts against the grain, but it is an essential lesson that leads naturally to shifting our preoccupation from possessions to intellectual and human concerns.

The energy crisis doesn't mean a Spartan life but it does mean a slower, more frugal America. There will be energy enough for decent housing space conditioning and basic appliances such as a dishwasher for all Americans if income distribution problems can be overcome. But rather than spending our lives piling up more and more things we can show the world how much is enough for the good life and gain more of our satisfactions from our minds, spirits and relations with other people.

The energy crisis is an opportunity for greatness and service. As a nation which epitomizes waste we can lead the way toward a society that can use resources with intelligent frugality and this endure. We can begin to discharge our obligations to future generations by stopping our gluttonous exhaustion of resources that must last for centuries. We can avoid putting our own destiny in the hands of the nations who are lucky enough to possess huge oil resources. And we can preserve our most basic resources--the air, water, and the land--for ourselves and our children to enjoy.

The energy crisis and the conservation response offer lessons that can set the tone for American life for the rest of the century and beyond. If properly taught it can bring to the forefront the moral and ethical values that have taken second place in so many of our lives. It can also appeal to the common sense and Puritan ethic that teaches us that a spendthrift nation must eventually come upon bad times. I hope you will join in the happy adventure of turning this dark cloud into a new pattern of life in America, one that will combine material satisfactions with the greater enjoyment and pursuit of human values.

AN IECL BIBLIOGRAPHY OF ENERGY CONSERVATION MATERIALS PRODUCED BY STATE EDUCATION AGENCIES

NOTE: This descriptive bibliography of energy-related environmental education and energy conservation instructional materials is provided by the INTERSTATE ENERGY CONSERVATION LEADERSHIP PROJECT (IECL). Many of these items are a part of the IECL clearinghouse while others were excerpted from other bibliographies.

By providing this bibliography, IECL does not wish to imply that these are the only materials available through state departments of education. Nevertheless, we have every reason to believe that this list is as complete a document as can be found with regard to energy conservation materials produced by state education agencies.

* Indicates that the material is not in the IECL clearinghouse but has been mentioned in some other bibliography.

ALABAMA

* Suggestions for Teaching Energy Conservation in Home Economics. Alabama Department of Education, Division of Vocational Education and Community Colleges, Home Economics Education, Montgomery, AL 36104.

* An Easy Understanding of Electricity, by James R. Carroll. A guide for teaching electricity experimentally. Tennessee Valley Authority, Division of Power Marketing, Muscle Shoals, AL 35660.

ARIZONA

* My Energy is your Energy, February 1974, elementary energy guide.

CALIFORNIA

The Energy Crisis in the Public Schools: Alternative Solutions. Ventura County Superintendent of Schools, County Office Building, Ventura, CA 93001 (Dr. James F. Cowan, Superintendent). This is perhaps the most comprehensive "checklist" approach to energy conservation and the schools in existence. It grew out of a series of problem-solving workshops conducted in January, 1974 in Ventura, Calif. The workshops were attended by 180 school administrators, classroom teachers, and directors of transportation, food services, and maintenance and operations. The 78-page booklet consists of a series of lists of energy-savings ideas which are simply numbered and arranged under headings such as "Transportation of Pupils," "Food Services," "Heating and Air Conditioning," etc. A brief bibliography is included.

See also:

* Energy and Careers for Tomorrow, Mooy, Len and Don Stillman, 1974. Career Education Concept Series (elementary grade level). Santa Barbara School Districts, Career Education Projects, 309 Princeton Ave., Santa Barbara, CA 93111.

COLORADO

A TEACHER'S HANDBOOK ON ENERGY. Compiled by a number of teachers, science advisors, and environmental education specialists in April 1974, under the direction of the Colorado Department of Education, Supporting Services Unit. The Handbook contains background information on energy, a series of checklists, classroom activities, a section on conservation and a bibliography. The Handbook may be obtained by writing to Dr. Calvin E. Anderson, Director, Supporting Services Unit, Colorado Department of Education, 201 E. Colfax Ave., Denver, CO 80203.

FLORIDA

Florida Master Plan and Action Guide for Environmental Education. This is a thirty-three page document aimed primarily at Florida teachers and administrators. It outlines some general plans and strategies for implementing environmental education programs. Publication available through the Bureau of Environmental Education, Department of Education, 347 Miles Johnson Building, South Duval St., Tallahassee, FL 32304.

See also:

* A Teacher's Environmental Resource Unit: Energy and Power. Center for Environmental Learning, Brevard County School, 705 Avacado Ave., Cocoa, FL 32922.

IOWA

Iowa was one of the leaders in recognizing the threat of the energy crisis to the nation's schools. It was also one of the first states to develop a comprehensive energy-environment resource materials guide. This guide, entitled Energy Materials, was published during the 1973-74 school year. It contains detailed bibliographies, including audio-visual materials, a list of classroom activities for elementary intermediate, and secondary levels, and a brief glossary of energy terms. The publication may be obtained by writing to Donald V. Cox, Associate Superintendent for Instruction and Professional Education, State of Iowa, Department of Public Instruction, Grimes State Office Building, Des Moines, IA 50319.

KANSAS

* Energy, January 1974. Provides upper elementary students with basic information about (1) what energy is, (2) where it comes from, (3) how we use it, and (4) ways we can more wisely use the energy available to us.

* Energy and You, January 1974. Presents information regarding energy problems for Level II and III educable mentally retarded students.

MASSACHUSETTS

* The Energy Crisis--Aids to Study, January 1974. Massachusetts Audubon Society, Hatheway Environmental Education Institute, Lincoln, MA 01773. Compiled for U.S. Office of Education. Bibliography of books, magazine articles, and curriculum aids which will be useful in beginning a study of the energy crisis.

MICHIGAN

* Energy Conservation-Guidelines for Action, 1974. Contains curriculum guidelines and background information for teachers in addition to

MICHIGAN (cont'd)

sample activities used in Michigan schools. Write to Region Nine Superintendent, Michigan Association of School Administrators, 421 W. Kalamazoo St., Lansing, MI 48933.

* Greep on Energy. (K-12) Mini units designed by students to be taught to other students with teacher as facilitator. Write to Project S.E.E., Wyandotte Public Schools, 891 Goddard Rd., Wyandotte, MI 48192.

* A Guide to Teaching Resources and Supplement, 1973-74 edition. Listing of resource materials and services offered free by Consumers Power Company to teachers and schools in all communities served by the company. Write to Consumers Power Company, Educational Services Program, 212 W. Michigan Ave., Jackson, MI 49201.

NEW JERSEY

* "Energy Crisis: A Teacher's Resource Guide," NJEA Review 47: 33-44, February 1974. Reprints available from the New Jersey Education Association. This is part of three larger computer resource units.

NEW YORK

The New York State Department of Education has been extensively involved in producing environmental education materials. The most important of these publications are: Environmental Education Instructional Activities, (reprinted December 1972) (two booklets, K-6 and 7-12). In terms of their printed format, these are some of the most aesthetically pleasing activity guides available. Some chapter headings are "Survival," "Interdependence," "Scarcity," and "Social Forces."

Somewhat more inclusive in terms of disciplines covered is Living within our Means: Energy and Scarcity, which includes activities for English Language Arts, Social Studies, Mathematics, and Science.

For copies of these publications write to: Environmental Education, University of the State of New York, State Education Department, Albany, NY 12224.

See also:

* Coping with the Problems of the Technological Age. Parts I & II, State Education Department, Bureau of Secondary Curriculum Development, Albany, NY 12224.

NEW YORK (cont'd)

* Energy: Key to the Future. Teaching techniques for the understanding and conservation of energy, K-12, February 1974. Dutchess County Board of Cooperative Educational Services, Route 1, Salt Point Turnpike, Poughkeepsie, NY 12601.

* Our Spaceship Earth--Needs More Fuel, 1974. Illustrated booklet on energy, grades 4-10, with teacher's guide. Utilities Educational Services, Division of Custom Comics, Inc., 10 West 19th St., NY 10001.

NORTH CAROLINA

Environmental Education Strategies for Wise Use of Energy. Division of Science Education, North Carolina Department of Public Instruction, Raleigh, NC 27611. This 71-page K-12 guide provides instructional activities, energy "IQ" tests, charts, checklists, and a bibliography. The Appendix contains a number of useful graphs and other "visuals."

See also:

* America Runs on Electricity--The Energy Crisis, grades 5-9. Environmental Education Center, 13 Veterans Drive, Oteen, NC 28805.

OHIO

* Guidelines for the Teacher. Toledo Public Schools, Environmental Education Program, Manhattan and Elm, Toledo, OH 43608.

OREGON

Energy Crisis: Teaching Resources. A publication prepared for Oregon's "Energy Crisis Week" suggests school activities which stress individual responsibility toward energy crisis problems. This 60-page document includes a bibliography, checklists, and graphs and charts indicating energy usage and expenditure. (Reprinted September 1974.) Oregon State Department of Education, 942 Lancaster Driver NE, Salem, OR 97310.

A Handbook of Environmental Encounters. This impressive handbook presents a number of "encounters" using authentic and simulated situations which relate to various environmental categories (i.e. Air, Water, Land Use Priorities, Energy, etc.). Each encounter, or chapter, contains an "objective," a "rationale," and a number of activities. This 140-page handbook includes a bibliography relevant to each section or encounter. The handbook is loose leaf, allowing for flexibility, and is attractively illustrated. Oregon State Department of Education, 942 Lancaster Drive, NE, Salem, OR 97310. 1973 (reprinted, 1974).

PENNSYLVANIA

The Environmental Impact of Electrical Power Generation: Nuclear and Fossil; for Secondary Schools and Adult Education (1973). This publication discusses U.S. energy production and demand. It describes a number of energy sources (most notably coal and atomic energy). It contains a brief chapter on energy conservation bibliography, and a glossary of terms. The document was produced by: The Pennsylvania Department of Education, Division of Science and Technology, Bureau of Curriculum Services, Box 911, Harrisburg, PA 17126.

Also of some interest to educators is Energy for Pennsylvania: An Action Plan for Energy Management in the Commonwealth of Pennsylvania (rev. April 1974). A document submitted to Governor Milton J. Shapp by the Governor's Science Advisory Committee.

Note: The Pennsylvania Department of Education has also produced an environmental Film Series entitled "But Where Will the Earth Land." Audio tapes of energy/environmental presentations are available by sending blank tapes to AUDIO-VIDEO DUPLICATION CENTER, BUREAU OF INSTRUCTIONAL SERVICES, DEPARTMENT OF EDUCATION, Rm. 321, Education Building, Box 911, Harrisburg, PA 17126.

See also:

* Energy: A Technological, Economic or Moral Crisis? By John H. Anderson, University of Pittsburgh, Department of Physics, Pittsburgh, PA 15260.

* The Energy Crisis: A Partial Bibliography, 1974. Compiled by Technical Publications Consultants. (mimeographed, 4 pages) Harry Hyde, Jr., and Associates, P.O. Box 429, Bryn Mawr, PA 19010.

SOUTH CAROLINA

* Conservation Curriculum Improvement Project (CCIP) guides. Energy topics in guides for Grade 5, Physical Science Grade 9, Social Studies, Grades 7, 8, 9. Available at $3.95 each through Albert H. H. Dorsey, Curriculum Development Section, South Carolina State Department of Education, Rm. 801, Rutledge Bldg., Columbia, SC 29201.

South Carolina is in the process of developing a brief publication for their school districts. Additional information may be obtained by writing to Alice Linder, Environmental Education Consultant at the South Carolina Department of Education.

TENNESSEE

The University of Tennessee has established the Tennessee Environment Center (University of Tennessee, South Stadium Hall, Knoxville, TN 37916). The TEC has produced a number of publications of interest to the general public on the subject of energy conservation.

See also:

* Energy Activities and Resources for the Secondary Student, 1974-75. Produced by the Kingsport City Schools, Environmental Education Program, Kingsport, TN 37664. Energy-related materials for the secondary level (7-12) student, including several interdisciplinary activities, for the purpose of creating within the student an awareness of energy-related problems through involvement.

* Farm Electricity. Produced by the State of Tennessee, Department of Education, Division of Vocational Education, Nashville, TN 37219, in cooperation with TVA. This publication demonstrates the fundamentals in electricity, wiring and materials, farm motors, and electrical controls, primarily for vocational teachers. Published by Vocational Curriculum Laboratory, Box 1114, Murfreesboro, TN 37130.

* Environmental Education Teacher's Handbook. Lib Roller, Coordinator, Nashville Metro Schools, Environmental Education Department, Nashville, TN.

TEXAS

Texas is in the process of developing energy-related environmental education materials. For further information write to Mr. C.S. (Bill) Story, Program Director, Science Section, Division of Curriculum Development, Texas Education Agency, 201 E. Eleventh St., Austin, TX 78701.

VIRGINIA

Virginia has developed an environmental activities guide entitled Environmental Education Guide K-12 (July 1974). It appears to be one of the best "framework" guides available. Sample "investigations" of environmental problems are provided for the teacher, each investigation centered around a specific area (i.e. "The Classroom Environment," "Transportation and the Environment," etc.) Each investigation provides a list of "goals and objectives" together with questions and suggestions for conducting the investigation. This booklet, which contains an annotated bibliography, is available through the Divisions of Elementary, Secondary, and Vocational Education, State Department of Education, Richmond, VA 23216.

In January 1974 the Virginia State Superintendent of Public Instruction published a lengthy memorandum (No. 6928) to all district superintendents on the subject of environmental education. This memo can practically stand on its own as an environmental education handbook for Virginia teachers and administrators. As a part of the "memo" all state-approved textbooks were surveyed and sections of these texts pertinent to energy conservation and environmental education were singled out. Suggestions on the incorporation of environmental education into other subject areas (English, Public Speaking, etc.) are included as are bibliographies of film and printed matter and classroom activities.

WASHINGTON

Create Tomorrow...Today: An Energy Awareness Program of the Washington State Superintendent of Public Instruction (March 1974). An attractive and comprehensive publication. This is an activities guide, a source of information on energy, and a resource book. The activities are designed for flexibility so that both group and individual efforts are provided. The publication includes a number of useful charts, bibliography, and a glossary. Interesting graphic work enlivens the format. Write to David Kennedy, Supervisor of Environmental Education Programs, Washington State Department of Public Instruction, Old Capitol Building, Olympia, WA 98504.

Energy and Man's Environment. One of the best known and certainly the most comprehensive and ambitious energy-environmental education programs in the country. EME offers a number of services to the educator including activity guides, in-service teacher seminars, and special curriculum projects. The program is unique in that it is sponsored almost entirely through funds from private industry. EME has been described as a "pioneering union between the educational and business community." EME's approach is to divide activities and objectives into the sub categories, "Utilitarian," "Scientific," "Ethical," and "Aesthetic" to encourage trans-disciplinary study. EME activity guides then use these objectives as sub-divisions in larger categories ("Uses of Energy," "Sources of Energy," etc.) Much of the illustration in the activity guide is done by elementary students. In addition to a number of good charts, the activity guide offers a glossary and a bibliography. Write EME, P.O. Box 200, Beaverton, ORE. Revised edition available September 1975.

A Thousand Suns. This outstanding 16mm film was developed for the Washington State Superintendent of Public Instruction for the State's Energy Awareness Week. The film is divided into three parts. Part one deals with the sun as a source of energy and with man's ability to control nuclear fusion. The second part views the accomplishments of present energy capabilities and looks at the relationship between energy use and waste. Part three presents alternatives to wasting ourselves and our plant. The 9-minute color film has won four awards within a year. The film is available from Department G.F.A., Arthur Barr Productions, Inc., P.O. Box 7-C, Pasadena, CA 91104. Purchase price $140.00; rental $15.00. For further information write to David Kennedy, Supervisor of Environmental Education Programs, Washington State Department of Public Instruction, Old Capitol Building, Olympia, WA 98504.

WEST VIRGINIA

Do We Understand Energy? A handbook relating to the use and conservation of energy. Produced by the Division of Instruction, Bureau of Instruction and Curriculum, West Virginia Department of Education, Charleston, WV 25305. A brief (14 or 15 pages) handbook describing the sources of energy (1974). It also contains energy conservation checklists and a teacher's guide to energy-related activities.

OTHER MATERIALS OF INTEREST TO THE ENVIRONMENTAL EDUCATOR

AND THOSE INTERESTED IN ENERGY CONSERVATION

A Better Way to Live: A Filmstrip Manual for Environmental Education (1973). The University of the State of New York, the State Education Department, Bureau of Continuing Education Curriculum Development, Albany, NY 12224.

Children's Edition of Selected Publications on the Environment. (EPA, September 1973.) A catalog of 29 items of interest to Environmental Educators. Write to Office of Public Affairs, U.S. EPA, Washington, DC 20460.

The Economy of Energy Conservation in Educational Facilities. Educational Facilities Laboratories, 477 Madison Ave., New York, NY 10022. Price $2.00.

Energy Activities with Energy Ant. This is basically a coloring book with games, puzzles, and cut-outs. Produced by the FEA, the book is "designed to give young children a basic understanding of energy and its uses, and to stimulate their interest in learning more about energy." Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Price $1.40. Stock #041-018-00054.

Energy Conservation and the Building Shell. Educational Facilities Laboratories, 3000 Sand Hill Road, Menlo Park, CA 94025. Price $3.00 postpaid.

Energy in Solid Waste: A Citizen Guide to Saving. Citizens' Advisory Committee on Environmental Quality. A 40-page pamphlet describing energy loss involved in the country's waste disposal patterns and suggesting alternative solutions to the problem. The pamphlet illustrates, through graphs, charts, and in narrative form, energy-saving potentials in recycling programs. It suggests several approaches for citizens' actions. The pamphlet contains a "Glossary of Solid Waste Terms," and a selected bibliography. The booklet is available through the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Price $1.25. The stock number is 4000-00319. A 25% discount is allowed on orders of 100 or more copies delivered to one address.

Energy Perspectives: A Presentation of Major Energy and Energy-related Data. Most of the information in this 200-page document is presented in the form of graphs, charts, and maps. The main areas of interest are supply, production resource reserves, and power capacity. There is a ten-page section at the end of the document dealing with energy and the environment. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Stock number 024-000-00812-6.

Environment and Society: People and Cities (1974). Instructor's activity guide for environment and the city dweller. The University of the State of New York, the State Education Department, Bureau of Continuing Education Curriculum Development, Albany, NY 12224.

The Impact of the Energy Crisis on School Finance. An Issue Paper delivered at the National School Finance Conference, New Orleans, Louisiana, by Dr. Calvin E. Anderson, IECL Project Director. Available through IECL.

The NSTA, Energy-Environment Materials Project. Energy-Environment materials for teachers have been produced by the National Science Teachers Association under contract to the Office of Education, Division of Technology and Environmental Education. The three products which have been produced are 1) a Source Book, 2) a Miniunit Guide, and 3) an E-E Materials Guide:

The Source Book is divided into two volumes. Volume I, Energy, Society and the Environment, covers the environmental and economic effects of energy conservation and energy policy. The emphasis in this volume is on a description of the complex interactions between energy, economics, and the environment. Volume II, entitled Energy, its Extraction, Conversion and Use, is the technical, scientific part of the Source Book. In this volume is included statistical data in the form of graphs and charts. Some chapter titles from this volume are "Energy, What It Is and What It Does," "The Energy Stockpile," and "The Flow of Energy."

In addition to the 14 chapters of these two volumes, there are six technical appendices. The first two are a glossary and a brief introduction to the mathematical vocabulary of the Source Book. The other four appendices supplement the Source Book with additional scientific background material on energy, work, and power, heat and heat engines, electricity, and nuclear energy.

The Source Book is designed to provide multiple purposes for teachers. It provides them with ready reference to existing data. It can be used chapter by chapter or it can be tied together into larger units. While Volume I will probably appeal more directly to social studies and humanities teachers and Volume II to science teachers, the Source Book was designed to demonstrate in a compelling way the necessary interaction of all these areas.

The Miniunit Guide contains seven learning packages which teachers can use to involve students in energy matters. These Miniunits, which cover a varying number of classroom meetings, range in level from primary to high school. Each Miniunit is designed to be a complete unit. The teacher does not need to provide any additional material or go to any reference outside of the Source Book.

NSTA (cont'd)

The third product, an E-E Materials Guide, is an annotated resource reference. It contains four reading lists. The most important of these is a teacher bibliography, broken down into topic areas along the same lines as the Source Book and annotated so as to give the teacher a content review of each reference and appropriate source information. The three other reading lists are for students and are separated into categories K-6, 5-9, and 8-17.

The specifics of distribution of these materials are now in the planning stages. It is expected that they will receive widespread distribution by Spring, 1975. For further information or inclusion on the mailing list, contact:

John M. Fowler
NSTA-EEMP
The National Science Teachers Assn.
1742 Connecticut Ave., NW
Washington, DC 20009

The Public Schools and the Energy Crisis, by S. David Freeman. A speech delivered to the IECL Boston Conference. Available through the IECL clearinghouse, Colorado Department of Education, 201 E. Colfax, Denver, CO 80203.

Save Energy: Save Money! Office of Economic Opportunity (December 1974). Published by the institute on Energy Conservation and the Poor for the National Center for Community Action. (40 pages) Energy conservation tips for the home. Write to The National Center for Community Action Network Services: Energy, 1711 Connecticut Ave., NW, Washington, DC 20009.

Solar Cooling for Buildings. Workshop Proceedings Held in Conjunction with the ASHRAE Semi-Annual Meeting, Los Angeles, California, February 6-8, 1974. Sponsored by the National Science Foundation Research Applied to National Needs: RANN. Prepared by Jet Propulsion Laboratory, Calivornia Institute of Technology. Ed. Francis de Winter, Workshop Coordinator.

This document contains some forty articles on solar cooling. Some selected subject areas include the use of solar-assisted heat pumps, solar absorption systems, technological problems, and others. The document includes graphs, schematics, photographs, and a bibliography. It is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Stock Number 3800-00189. (231 pages) Price $3.00

1974 Solar Energy Directory. Ed. Carolyn Pesko. Distributed by Environmental Action of Colorado, University of Colorado, Denver, 1100-14th St., Denver, CO 80202. (Project financed in part through a grant from the National Science Foundation.) $15.00

1974 Solar Energy Directory (cont'd)
This massive reference work provides information on a multitude of solar projects and publications as well as information on people and institutions involved in solar research and development. The computerized format is enlivened by ink drawings, poems, and quotations.

The Solar Resource: 14 Articles on Energy from the Sun. Articles compiled from Science Magazine, Environmental Quarterly, Business Week, and other sources. Write to Environmental Action Reprint Service, 1100-14th St., Denver, CO 80202.

The State Education Agency and Energy Conservation in Educational Facilities. A paper prepared for IECL by Joshua A. Burns, Associate Director, EFL. Available through the IECL clearinghouse.

Technical Options for Energy Conservation in Buildings. U.S. Department of Commerce, National Bureau of Standards, Technical Report #789. Available as SD Catalog No. C13.46:789 from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. $2.35 postpaid. A comprehensive introduction to technical means of saving energy in both existing and planned buildings.

Your World My World. Environmental Protection Agency (1973) GPO Stock No. 5500-00079. Attractively illustrated publication dealing with air and water pollution, garbage, pesticides, etc. Explains EPA standards and objectives (48 pages). $1.50

(Later additions)

Oil Shale and Energy Directory for Colorado. Denver: Colorado State Library in conjunction with Bureau of Community Services, University of Colorado-Denver Center, 1975. 25 pgs.

Directory of agencies and organizations interested in oil shale and energy development in Colorado; address and brief description given for over 120 different agencies from business and industry, Federal/State/Local government, interstate cooperatives, environment, conservation, and special interest groups.